

Observation Examples of Processed Foods

Instrument used : Scanning Electron Microscope (SEM)

Foods observed with SEM

Specimen deformation during SEM observation of food, due to the fat and water content, can occur either by vacuum conditions in the SEM specimen chamber or by thermal effects caused by electron beam irradiation. In order to counteract these effects, the cooling of the specimen before SEM observation is required with a cryo stage or LV cooling holder.

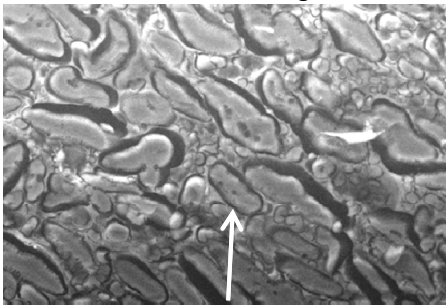
The cryo stage can cool and maintain the specimen at around liquid nitrogen temperature, allowing for observation and analysis of the specimens containing a lot of fats or water (mayonnaise, fresh cream, etc.). However, a conductive coating is often required.

The LV cooling holder allows for precooling the specimen with liquid nitrogen, although does not maintain this temperature. However, the LV cooling holder can be easily combined with low vacuum SEM, allowing for observation and analysis of uncoated samples with a lower water or fat content (raw meats, vegetables, etc.) for a short period of time.

This report presents morphological observation examples of some processed foods, with a cryo stage or LV cooling holder under low vacuum. Specimens used were carbohydrates, frozen foods and meat products.

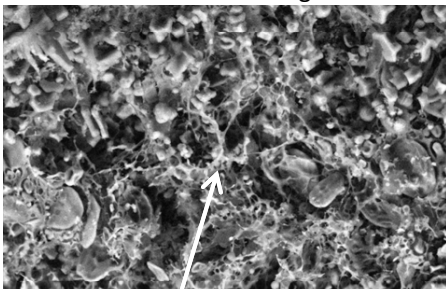
Carbohydrates

Fractured surface of boiled noodles
Cooled with LV cooling holder



Starch (cross section)

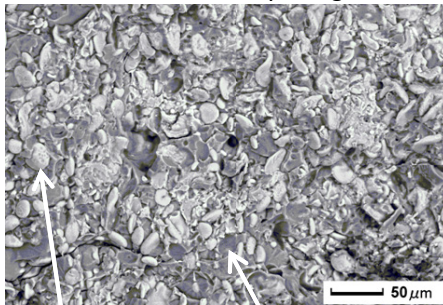
Cross section of baked bread
Cooled with LV cooling holder



Gluten (network-structure)

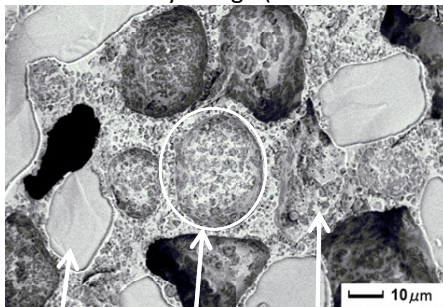
Frozen foods

Fractured surface of cream in croquette
Cooled with Cryo stage



Starch (bright-gray particle) Fats (dark-gray particle)

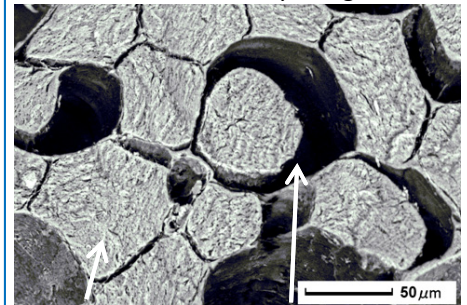
Fractured surface of whipped cream
Cooled with Cryo stage (Ice cross section)



ICE(Cross section) Bubble Fats (small gray particles)

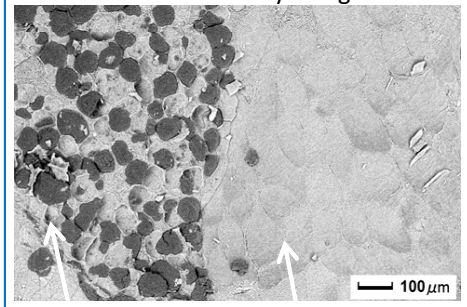
Meat products

Fractured surface of chicken
Cooled with Cryo stage



Muscle fiber (cross section) Void (ice sublimated)

Fractured surface of ham
Cooled with Cryo stage



Fats (cross section) Muscle fiber (cross section)

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